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LIFE HISTORY OF *CHIONAEMA COCCINAE* RECORDED FROM DEHRADUN, UTTARAKHAND

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ABSTRACT

Life history stages of the Arctiid moth *Chinaema coccinae*, Moore, 1878 (Subfamily Lithosiinae) were recorded in Wildlife Institute of India campus, Dehradun. Larva, pupa and cocoon structure along with male female dimorphism were described. The cocoon along with the pupa were kept upto emergence of the adult to confirm species identification.

Key Words: Cyana, Larva, Cocoon, Host plant, Moth, Life cycle

Introduction

Members of the genus *Chionaema* Older name: *Cyana* (Order: Lepidoptera, Suborder: Heterocera, Family: Arctiidae, Subfamily: Lithosiinae) belong to the tribe Nudariini (Holloway, 2001) and are represented by twenty-two species in Indian subregion (Hampson, 1894). The species *C. coccinae* Moore, has been recorded from Sikkim and Western Himalaya within Indian subregion. Outside India, it is recorded from Nepal, China, Thailand and Vietnam. The species is around 53 mm in size, head and collar ochreous, the latter fringed with crimson; thorax and abdomen crimson; the anal tuft ochreous. Wings are dark crimson; forewing with some black subbasal specks; a broad excurved antemedial band; an incurved submarginal band with dentate outer edge. In the male, presence of some sort of secondary sexual feature between the discal part of the cell and the costa is perhaps the most consistent feature for the genus. Strong transverse red, orange or yellow fasciation to the forewings and spotting in the discal area is also part of the generic ground plan. In *C. coccinae*, males are with three black spots in the cell and female with two. There is also considerable size difference between male and female, with the females slightly larger in size and colour little lighter. The larvae of the genus *Cyana* have mostly been recorded as feeding on most groups of lower plants: lichens, algae, mosses and liverworts (Holloway, 2001). They tend to graze on these wherever they are abundant, such as on moist walls, cliffs and rocks, the trunks and branches of trees and, in very humid biotopes, on leaves. The last locations may frequently have led them to be associated with the tree or plant concerned, and the identity of this gets propagated in the literature as the host-plant, e.g. perhaps many of the records in Yunus and Ho (1980) and Zhang (1994). But it is apparent (Common, 1990) that feeding on higher plants is rare in the group, but noted particularly in the species *C. coccinae* where four species of trees are recorded as its' larval host plants from India (Robinson *et al.*, 2010): *Camellia sinensis* (Theaceae), *Dalbergia sissoo* (Leguminosae), *Shorea robusta* (Dipterocarpaceae) and *Tectona grandis* (Verbenaceae), where withered or living foliage may be eaten. So far there were no records about larval morphology or other life history stages of this species. Nor this species were recorded in very large scale from Sal forest elsewhere. In the month of September and October, 2011 this species was observed in profusion around Dehradun, Uttarakhand, emerging from eggs deposited previous year.

Material and Methods

The measurement of larva, pupa and adult moth were taken by Vernier callipers with inch and millimetre graduations. The adult, larval and pupal morphology were observed under light microscope (Olympus, Japan).

Results and Discussion

In the late August, 2011 millions of caterpillar of *Chionaema coccinae* were observed descending to the ground with the aid of some long threads of silk from overhanging tree branches of sal (*Shorea robusta*). The caterpillars were around 22 mm, generally dark or marbled blackish brown or blackish grey, with groups of long black setae on verrucae. Within eight to ten days they underwent some major transformations through three-four instars, the size tending to increase and also the length of the setae. The final instar (Fig.1a), just

Life cycle of Arctiid moth (*Chinaema coccinae*) including its larva, pupa and cocoon along with sexual dimorphison has been described.

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Fig. 1: Different Life History Stages of *Chionaema coccinae* Moore, 1878; (a) The final instar larva, (b) the final instar larva after shedding the secondary setae to make the cocoon, (c) the cocoon and the pupa with the bottom emergence hole, (d) the pupa just before the emergence of the adult, (e) the female of the *C. coccinae*, (f) the male of the *C. coccinae*, (g) the female laying eggs, (h) the first instar larva just after hatching.

before going to pupation, was around 35-42 mm in length with paler ochreous or red markings on the thorax, in the anal area and in rows in each segment, often incorporating the verrucae. The length of setae sometimes exceeded 45 mm in length, especially in 3rd-4th and anal segments. After three-four days the final instar larva started pupating within a cocoon. The cocoon and pupa were oriented vertically (Fig.1b), cocoon measuring 40 × 28 mm, while the pupa was 20 × 6 mm, with the head region directed upwards. The colour of the pupa was a striking combination of brownish-orange with symmetrical black stripes and patches. The spiracles along its abdomen were also highlighted in black. Its ventral surface was parallel with the rock face and securely attached via a sparse network of silk. The cocoon was much larger than the pupa, ovate, suspended from a vertical surface, consisting of a very widely spaced but regular net of silk, including the secondary setae of the final instar larva, through which the pupa, suspended vertically in the centre, can be seen clearly. The cocoon structure resembled a cage, with quadrangles formed by the intersecting setae. At both apices of the cocoon, the setae converged over two apertures (Fig.1c): the bottom (posterior) aperture possibly facilitating disposal of its larval exuvia post-pupation, while the top (anterior) aperture allows for the emergent moth to climb out from.

After in-situ photography, two-three cocoons/pupae were carefully peeled off the substrate to be reared till metamorphosis. After two days, the pupa became shining glossy black in appearance (Fig.1d) with an incurved tapering end. On the second night at 10.30pm one female and two males emerged from three cocoons, all well-developed in adult form. The attractive red-and-black patterns over its overall white background were consistent with a published illustration for this species. Upon careful comparison between males and females of *Chionaema coccinae*, the inherent sexual dimorphism soon became apparent. A majority of these morphological differences resided in the forewing design/pattern. In males (Fig.1e), the black discal spots were more elliptical and three in number, while more roundish in females (Fig.1f) and two in number, the red markings on the apex are more extensive in males (less so in females), the tornus is more angular (broadly rounded in females). Examination of the underside of the male's forewings reveals the presence of prominent pinkish androconial patches at the anterior margin (absent in

females). The specimens were subsequently retained as voucher specimens and later deposited to the Zoological Survey of India, Head Quarter, Kolkata.

The females, right after emerging from the cocoon mated with males and started depositing eggs on the vertical wall surface (Fig.1g). The eggs were tiny white, slightly oval in shape (around 0.04 mm in diameter), laid in cluster of around 184-224 in one batch. They were arranged in 4-5 rows in an inverted club-head shape. Again after 3-4 days the first instar larva (Fig.1h) started emerging from the eggs. The next day onward they started to disperse from their site of emergence and within next two days, around last week of September, completely disappeared from the site. Any next instar was never seen again and they went probably in winter hibernating mode.

The remarkable life history of this species was previously not published from any part of the world. Outbreak of the species was also recorded from Rajaji National Park, Uttarakhand. The species is reported as serious defoliator of tea plants from Malaysia. It is also reported from Northern Thailand to visit flowering teak (*Tectona grandis* L.f.) canopies and thus acting as a potential pollinator of the teak (Tangmitcharoen, *et al*., 2006). The subfamily Litosiinae as a whole has acted as a promising candidate as indicator species in response to mild level of disturbance. The survey of lowland softwood plantations by Chey (1994), Intachat *et al*. (1997) in Borneo showed that many *Cyana/Chionaema* species can persist in these managed systems, some becoming quite abundant, they even persisted in areas disturbed by cycles of shifting cultivation. Thus the species, *Chionaema coccinae* with well described life history stages and host plants recorded, is a potential candidate as an indicator in rapid habitat assessment in Western Himalayan foothills where all the four species of its host-plant were recorded.

देहरादून उत्तराखण्ड से रिकार्ड किये गये *चाइनामा कोकीनाई* का जीवन चक्र

अबेश कुमार सन्याल, वी.पी. उनियाल और कैलाश चन्द्र

सारांश

देहरादून के भारतीय वन्यजीव संस्थान परिसर में आर्कटाईड शलभ *चाईनामा कोकीनाई,* मूर 1878 (उपयुल लाईथेसीनाई) के जीवन इतिहास की स्थितियां रिकार्ड की गई। नर–मादा के साथ लारवा (Larva), प्यूपा तथा कोनून संरचना का वर्णन किया गया। प्रजाति पहचान सुनिश्चित करने के लिए कोकून को प्यूपा के साथ वयस्क होने तक रखा गया।

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